



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,133	02/09/2004	Hideaki Takahashi	SIMTEK6753	2132
25776	7590	08/06/2004	EXAMINER	
ERNEST A. BEUTLER, ATTORNEY AT LAW 10 RUE MARSEILLE NEWPORT BEACH, CA 92660			NGUYEN, TRAN N	
			ART UNIT	PAPER NUMBER
			2834	

DATE MAILED: 08/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/708,133

Applicant(s)

TAKAHASHI ET AL.

Examiner

Tran N. Nguyen

Art Unit

2834

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

Claims 1-8 are objected to because of the following informalities:

Among claims 1-8, there are typing errors such as spacing between words should be corrected.

Among claims 1-8, the term “the divisions” should be changed to “the individual core divisions” for consistently referred antecedent basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. **Claims 1-4** are rejected under 35 U.S.C. 103(a) as being unpatentable over each individual references: **Crapo et al (US 6,707,209)** or **Carpenter et al (US 4,642,502)** or **Arakawa (JP63-140645)**.

Crapo (figs 1, 6, 11) or **Carpenter (figs 1-3)** or **Arakawa (figs 1-3)**, each of these reference discloses a magnet field type rotary electric apparatus comprise of a rotor and a cooperating stator rotatably relative to each other about an axis, one of said rotor and said stator being comprised of a plurality of circumferentially spaced permanent magnets and the other of said rotor and said stator with a plurality of circumferential pole teeth surrounded by coil windings, at least one of said plurality of circumferentially spaced permanent magnets and said plurality of

Art Unit: 2834

circumferentially spaced pole teeth divided in an axial direction into plurality of stages (n) each of which is circumferentially displaced around said axis at angular intervals of an angle relative to each other, wherein the plurality of stage (n) is equal to 3 (in Crapo's and Carpenter's rotor) or greater than 3 (n=4 in Arakawa's rotor), and wherein each of the rotor core divisions carries the magnets.

Each of the refs substantially disclosed the claimed invention, except for the limitations of the Θ degrees relative to each other, said displacement angle expressed as $\Theta = 360 (\text{degree}) / (A \times n)$, where "A" is the least common multiple of the number of pole teeth and the number of magnets and "n" is plural stages (of the core).

Those skilled in the art would understand that the skew angle of the permanent magnet rotor is for reducing cogging torque that adversely impacts the machine performance creating vibration and noise. The range of this skew angle depends on the size/shape of the rotor and the stator because the cogging torque is caused by the variation of magnetic permeance as seen by a rotor pole as it passes the stator poles and the slot openings. Thus, based upon the size/shape of the rotor with its number of rotor axial magnets divisions, and the size/shape of stator with its number of stator poles, it would have been obvious to an artisan to mathematically determine the workable range of the skewed angle of the rotor magnet.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the machine by calculating the skew angle thereof based upon the size/shape of the rotor and the stator, i.e., skew angle base upon the number of the axial skewed core divisions (i.e., stages) and number of stator poles. Doing so would effectuate the skew effect to maximize the reduction of cogging torque. Also, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Art Unit: 2834

2. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over one of **Crapo, Carpenter and Arakawa**, as applied in the rejection against the base claims, and further in view of **Berrong et al** (US 6,321,439).

Each of the above applied refs discloses the claimed invention, except for the added limitations of the laminated sheets of the core divisions are connected to each other by first fasteners and all the core divisions are affixed together by second fasteners and there are clearance opening formed to clear the rivets of the other one of the adjacent divisions.

Berrong, however, teaches a modular design for the magnetic core of one of a stator and a rotor, wherein all the core divisions are fastened together by passing-through rivets (65, 66), which is read as the claimed "second fasteners", while each core division (10) is fastened by epoxy bonding impregnating process, which is broadly read as the claimed "first fastener". This would enable the modular core division to be pre-fabricated and the entire core be assembled at a different time, as well as to permit assembling magnetic cores with predetermined core lengths.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the machine by employing first fasteners to secure the laminated core sheets of each individual core division and to secure the entire core together by a second fastener, as taught by **Berrong**. Doing so would enable the modular core division to be pre-fabricated and the entire core be assembled at a different time, as well as to permit assembling magnetic cores with predetermined core lengths for respective suitable size/shape of the machines.

3. **Claims 6-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over one of **Crapo, Carpenter, or Arakawa**, and **Berrong**, as applied in the rejection against the base claims, and further in view of **Katsuzawa et al** (US 5,043,616).

The combination of the above applied refs discloses the claimed invention, except for the added limitations of the first rivets of adjacent of the core divisions are circumferentially offset from each other, and each of the adjacent divisions are formed with clearance openings to clear the rivets of the first fasteners of the other one of the adjacent divisions.

Those skilled in the art understand that **Berrong** does teach the use of rivet or bolt as fasteners. Therefore, it would have been obvious to one skilled in the art to select a suitable type of fasteners for each core division. This is a matter of obvious engineering design choice. For

Art Unit: 2834

example, fasten each core division with rivets would enable replacement of individual laminated core sheets if need, and would simplify the assembling process for the core division, while fasten the core division by epoxy bonding impregnating would enable the core to obtain a strong insulating characteristic and unitary. Because the core divisions are assembled at a skew angle with respect to the rotary axis, obviously the adjacent of the divisions are circumferentially offset from each other.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the machine by employing rivets as first fasteners to secure the laminated core sheets of each individual core division because doing so would be a matter of obvious engineering design choice since rivets are well known fastener means and also taught as means for fastening core by Berrong.

Furthermore, **Katsuzawa**, also teaches the core being assembled by rivet (30) wherein the head (30a) of the rivet is situated within a counter-bore so that the head would not project out therefrom. Those skilled in the art would understand that the Katsuzawa's important teaching is that by providing counter-bore for the rivets' heads the projection of the head can be avoided. Applying this teaching in the assembly of core divisions, it would have been obvious to an artisan to provide clearance for the rivets' heads whether provided the clearance on the same core division or on the other adjacent core division is a matter of obvious engineering design choices, as long as the rivets' head would not projecting out to form a gap between adjacent core division for create a magnetic leakage that interferes with the purpose of skew-angled rotor to reducing cogging torque.

Thus, it would have been obvious to one skilled in the art at the time the invention was made to modify the machine by forming clearance for the rivets' heads on the core divisions. Doing so would prevent an undesired gap, which causes flux leakage, between the core divisions.

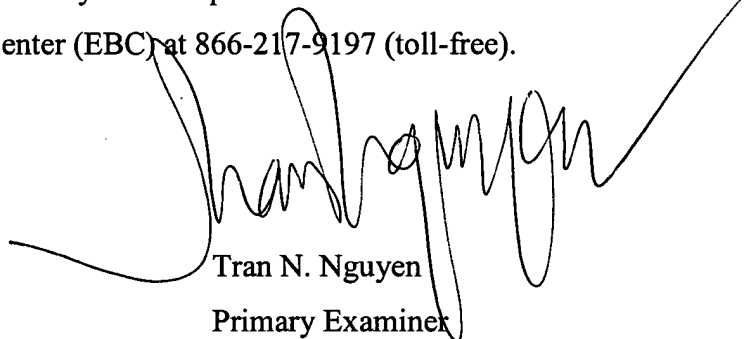
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tran N. Nguyen whose telephone number is (571) 272-2030. The examiner can normally be reached on M-F 7:00AM-4:00PM.

Art Unit: 2834

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571)-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Tran N. Nguyen', is written over the printed name and title.

Tran N. Nguyen

Primary Examiner

Art Unit 2834